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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,795	04/13/2004	Jun Li	ARC-15173-1	9102

25186 7590 06/23/2005

NASA AMES RESEARCH CENTER
ATTN: PATENT COUNSEL
MAIL STOP 202A-4
MOFFETT FIELD, CA 94035-1000

EXAMINER	
WALBERG, TERESA J	

ART UNIT	PAPER NUMBER
3753	

DATE MAILED: 06/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/825,795	LI ET AL.	
	Examiner	Art Unit	
	Teresa J. Walberg	3753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-26 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 18 October 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 5-8, 11, 12, and 14-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLorenzo et al (6,891,724) in view of Purinton (5,818,700).

DeLorenzo et al disclose a method and apparatus for transport of thermal energy as claimed including providing an array of carbon nanotubes, causing exposed second ends of the nanotubes to make contact with a surface of an object for transport of thermal energy such that the ends of the tubes buckle. DeLorenzo et al do not teach filling a portion of an interstitial space with a filler material so as to leave the second ends exposed. Purinton teaches providing a filler material (41) around an array of "fibrils" (Fig. 5 and col. 7, lines 55-57) and teaches that the ends of the fibrils may be exposed (see Fig. 6). It would have been obvious in view of Purinton to provide a filler material around the nanotubes of DeLorenzo et al, the motivation being to better hold the nanotubes in the desired positions.

With respect to claims 18, 19, 25, and 26, it would have been obvious to one of ordinary skill in the art to use any desired level of thermal resistance based on the heat generated and the maximum desired temperature.

3. Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLorenzo et al (6,891,724) in view of Purinton (5,818,700) as applied to claims 1, 2, 5-8, 11, 12, and 14-26 above and further in view of Ting et al (5,837,081).

DeLorenzo et al in view of Purinton disclose a method and apparatus for transport of thermal energy as claimed, but do not state that the array of nanotubes was grown by use of a catalyst. Ting et al teaches (col. 1, lines 59-65) that it is known in the art to use a catalyst as claimed to grow carbon nanotubes. It would have been obvious in view of Ting et al to grow the nanotubes of DeLorenzo et al in view of Purinton by use of a catalyst, since Ting et al teaches that such nanotubes have superior physical properties.

4. Claims 3 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLorenzo et al (6,891,724) in view of Purinton (5,818,700) as applied to claims 1, 2, 5-8, 11, 12, and 14-26 above and further in view of Choi et al (6,504,292).

DeLorenzo et al in view of Purinton disclose a method and apparatus for transport of thermal energy as claimed, but do not teach making the filler material of the specified materials. Choi et al teaches (col. 4, lines 52-58) that it is known in the art to use a metal layer, including Au, Ag, Pt, or Pd, with carbon nanotubes for improved conductivity. It would have been obvious in view of Choi et al to use the specified metallic material for the filler material with the nanotubes of

DeLorenzo et al in view of Purinton, since Choi et al teaches that such a layer gives the nanotubes have superior physical properties.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeLorenzo et al (6,891,724) in view of Purinton (5,818,700) as applied to claims 1, 2, 5-8, 11, 12, and 14-26 above and further in view of Dean et al (6,713,151).

DeLorenzo et al in view of Purinton disclose a method and apparatus for transport of thermal energy as claimed, but do not teach making the length of the nanotubes that is covered by filler material substantially equal to the length that is exposed. Dean et al teaches (see Fig. 1B) that it is known in the art to provide heat conductive fibers in which the length of the fibers that is covered by filler material is substantially equal to the length that is exposed. It would have been obvious in view of Dean et al to provide approximately half of the fiber length exposed above the filler material with the nanotubes of DeLorenzo et al in view of Purinton, since that would give the nanotubes greater flexibility while still holding them securely in place.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mittal (4,485,429), Banks et al (5,316,080), Koon et al (5,725,707), Koon et al (5,898,570), Knowles et al (2002/0100581), and Dangelo (2004/0152240) are cited to show the use of nano-scale fibers used in heat transfer.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Teresa J. Walberg whose telephone number is 571-272-4790. The examiner can normally be reached on M-F 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gene Mancene can be reached on 571-272-4930. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Teresa J. Walberg
Primary Examiner
Art Unit 3753

tjw